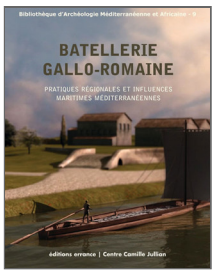

Giulia Boetto, Patrice Pomey et André Tchernia (dir.)

Batellerie gallo-romaine
Pratiques régionales et influences maritimes méditerranéennes

Publications du Centre Camille Jullian

2 – Recent research on roman shipfinds from the Netherlands

Recherche récente sur les découvertes de navires romains aux Pays-Bas

André van Holk

DOI: 10.4000/books.pccj.994
Publisher: Publications du Centre Camille Jullian, Éditions Errance
Place of publication: Aix-en-Provence
Year of publication: 2011
Published on OpenEdition Books: 13 February 2020
Serie: Bibliothèque d'archéologie méditerranéenne et africaine
Electronic ISBN: 9782957155781

http://books.openedition.org

Printed version
Date of publication: 1 November 2011

Electronic reference
HOLK, André van. *2 – Recent research on roman shipfinds from the Netherlands* In: *Batellerie gallo-romaine: Pratiques régionales et influences maritimes méditerranéennes* [online]. Aix-en-Provence: Publications du Centre Camille Jullian, 2011 (generated 04 avril 2020). Available on the Internet: <http://books.openedition.org/pccj/994>. ISBN: 9782957155781. DOI: https://doi.org/10.4000/books.pccj.994.

2 - André van HOLK

Recent research on roman shipfinds from the Netherlands

Summary

In this paper new and old finds of barges and a punt from the Roman Era are discussed. Since 2003 four new wrecks dating from the second to the third century AD were discovered along the *limes* in the Netherlands. These wrecks have been studied and published in Dutch. As some remarkable information came to light about the provenance of wood (*De Meern 1* and *4*, *Woerden 7*), crew composition and live-on-board (*De Meern 1*), the sequence of construction and the use of the Mediterranean mortice-and-tenon technique to connect the strakes (*De Meern 4*), a complete new ship type, a punt (*De Meern 6*), details about propulsion (*Woerden 7*), new research was started on the barges *Zwammerdam 2* and *6* and the barge *Woerden 7*. This article gives an overview of these new finds and this new research project for a broader audience in English.

Keywords
Artefactual inventory, barge, crew-composition, dendrochronology, *limes*, live-on-board, punt, roman, ship-construction, wood-provenance

Recherche récente sur les découvertes de navires romains aux Pays-Bas

Résumé

Cet article présente les nouvelles et anciennes découvertes de barges et d'un *punt* de l'époque romaine. Depuis 2003, quatre nouvelles épaves, datées du II^{e} au III^{e} s. ap. J.-C., ont été retrouvées le long du *limes* aux Pays-Bas. Ces épaves ont été étudiées et publiées en néerlandais. Elles ont fourni des informations très intéressantes concernant la provenance du bois (*De Meern 1* et *4*, *Woerden 7*), la composition de l'équipage et la vie à bord (*De Meern 1*), la séquence de construction et l'usage de la technique méditerranéenne par tenon-et-mortaise pour l'assemblage des virures (*De Meern 4*), un *punt*, type de navire totalement nouveau (*De Meern 6*) et des détails sur la propulsion (*Woerden 7*). Pour ces raisons, de nouvelles recherches ont été entreprises sur les barges *Zwammerdam 2* et *6* et *Woerden 7*. Cet article donne une vue d'ensemble de ces nouvelles découvertes et de ce nouveau projet de recherche afin d'en assurer une meilleure diffusion.

Mots clés
Mobilier, barge, équipage, dendrochronologie, *limes,* vie à bord, punt, romain, construction navale, provenance du bois

Fig. 1. Map showing the *limes* and the findspots of the Roman wrecks (drawing E. Bolhuis, GIA).
1 = *Zwammerdam 2* and *6* (*Nigrum Pullum*) ; 2 = *Woerden 7* (*Laurum*) ; 3 = *De Meern 1* ; 4 = *De Meern 4* ; 5 = *De Meern 6*

Introduction

Since 2003 four new wrecks dating to the second and the third century AD have been found along the *limes* in the Netherlands. The preliminary results of the *De Meern 1* excavation have been published in English in the proceedings of the tenth ISBSA (van Holk 2006, p. 295-299), while three wrecks (*De Meern 1* and *4* and *Woerden 7*) have been published in Dutch (Jansma, Morel 2007; de Groot, Morel 2007; Blom, Vorst, Vos 2008). The wreck *De Meern 6* has been published as an internal report (Morel, n.d.). To make these investigations available to a wider audience the results are summarized in this paper in English.

Furthermore, we would like to draw the attention to new research on the conserved barges 2 and 6 from Zwammerdam and the barge *Woerden 7*. The research questions of this project are directed towards the procurement and management of raw material, the building sequence and other aspects of the construction, as well as the function and disposal of barges in use on the lower Rhine (see *infra*).

De Meern 1

The *De Meern 1* barge was found in 1997 and excavated in 2003. The wreck was found in a side-branch of the River Rhine, the *Heldammer stroom*, at only six meters from the Roman road (**fig. 1**). Because the vessel was wrecked and not reused or sunken on purpose – as is the case with most of the Dutch wrecks from the Roman era – and quickly got covered by sediments, an extremely rich artefactual inventory was recovered.

The building date of the vessel was established by dendrochronological research at 148 AD. The foundering must have taken place some forty years later, as could be made up from the composition of the artefactual inventory. But far more interesting was the result of the dendrochronological research concerning the provenance of the wood. It was a big surprise that the trees used for building the ship had grown in the middle part of the Netherlands. This means that the vessel was built in the nearby surroundings. So the hypothesis of Roman ships being built upstream the Rhine is untenable. Dendrochronological analyses led to some other interesting results. Certain elements of the ship were built out of the same tree: for example the L-shaped chines that form the transition between the bottom and the sides. The L-shaped chine is a common feature of the Zwammerdam-type barges.

The hull-form of *De Meern 1* is extremely simple: a box-like vessel with for-and-aft swimheads. A striking feature of the hull-form is the extreme L to B ratio of 9,1: 1. The ship was clearly adapted to narrow waterways (while still carrying as much cargo as possible).

The bottom of *De Meern 1* consists of four wide bottom planks, in carvel position. The sides consist of an overlapping strake nailed to the standing part of the L-shaped chine. A narrow wash strake is nailed against the side strake. The framing system is regular and consists of double (paired) floor timbers with a floor timber knee against the starboard and port side.

The presence of spike-plugs is an indication for the use of temporary timbers to keep the bottom planks together, before inserting the frames. The frames are nailed to the strakes from the inside and from the outside. This means that the ship had to be turned over during the building process. Above each seam between the planks, a limber hole is cut in the underside of the floors. According to Morel (Jansma, Morel 2007, p. 142) these were used for ventilating the seams.

Slanting nails were used to connect the bottom planks for-and-aft, while long nails run through the thin part of the planks to connect the scarfs (**fig. 2**). This type of fastening could reflect a way of thinking about how a boat should be built. In this case by mortice-and-tenon (a mental template), which implies that planks are connected through the sides of the planks (van Holk 2006, p. 296). Other interesting details of the construction are the T-shaped stern and two 'beam-cradles' meant to support a removable beam. On top of the T-shaped stern probably a steering oar was mounted. It is possible that the removable beam supported a temporary deck to stand on while steering the vessel. Another curious detail are the zigzag lines cut into the strakes (both fore-and-aft). Were they made to absorb tension in the planking at the point of the swim-head where bending of the planks was at a maximum?

For propulsion a mast step was cut into the thick part of one of the floor timbers (the zig-zag lines in the bow are situated just in front of the mast step). Beside the mast step two iron braces were mounted through which a wedge could be driven to secure the back of the mast foot.

In the *De Meern 1* wreck an extremely well preserved inside lining was present. The vessel was divided by three partitioning walls in two different living quarters: a cabin aft and in front of that a galley. The foremost compartment is interpreted as a galley because a roof-tile blackened by fire was found there, while the ceiling also showed traces of fire. The galley was only accessible through the front bulkhead, from the hold. The spatial separation of these two live-spheres might reflect a

Fig. 2. Long nail running through scarf between two elements of the L-shaped chine (photo T. Penders, RCE).

Fig. 3. Cupboard and box found at a high level in the cabin (photo J.Koch).

Fig. 4. Tools from the cabin (photo J.Koch).

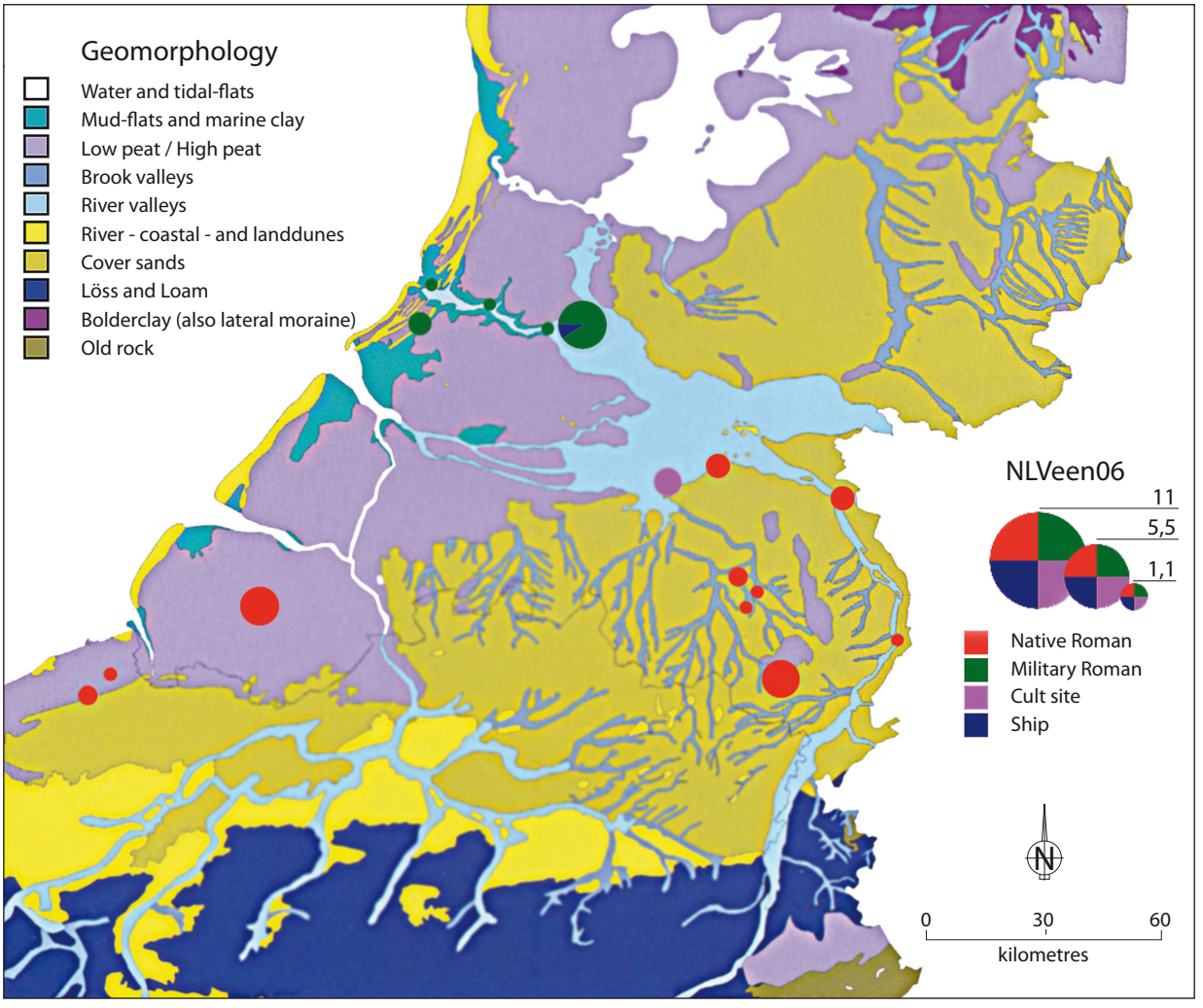

Fig. 5. Map showing the provenance of some of the wood samples from *De Meern 4* (after Jansma, Morel 2007).

social segregation on board between the skipper and the other members of the crew (van Holk 2006, p. 297).

A very exciting moment during the excavation was the finding of a cupboard and a box at a high level in the cabin (**fig. 3**). Probably the cupboard and the box had started drifting after the ship had sunk and got stuck against the roof of the cabin, which was obviously at that time, still in place.

The artefactual inventory is dealt with in great detail in the comprehensive publication on the *De Meern 1* vessel (van Holk 2007, p. 257-268). So only some conclusions based on the study of the material will be presented here. It could be concluded that in the cabin at least one grown-up male resided. The tools indicate that he was involved in carpentry and stonework (**fig. 4**). The idea is that the skipper carried out maintenance work along the *limes*. The military objects found in the vessel suggest that he was a veteran from the Roman army. Especially the fashionable shoes show that he was romanised, that is to say, integrated in Roman society and culture. He was used to move around in Roman company and to a certain extent well-to-do.

De Meern 4

De Meern 4 was found just after the excavation of *De Meern 1* was finished, at a distance of only 150 m from the *De Meern 1* site (**fig. 1**). A big difference with the *De Meern 1* shipfind is the fact that *De Meern 4* was reused as a river embankment and not foundered like *De Meern 1* 'in action'. The ship was only partly excavated ; but nevertheless the results of the investigation are of great interest from a nautical archaeological point of view. The dimensions of the vessel had to be reconstructed. The estimated overall length is 27 m, while the greatest beam is 3,7 m. The stern was only preserved as a soilmark.

Dendrochronological analysis of the wood samples gave a felling date of 100 AD for the trees used to built the ship. Again the most surprising result was the provenance of the wood: the mid-Netherlands. This result indicates that the wharf where the vessel had been built was probably situated in that area (**fig. 5**). This is a confirmation of the hypothesis concerning *De Meern 1* that at least some of the Roman barges found in the Netherlands are of local origin.

The *De Meern 4* is, not surprisingly, constructed with an L-shaped chine. The seven bottom planks are somewhat narrower than the ones of *De Meern 1*. The side consists of a carvel side plank. On the outside a whale is nailed against the side strake. Against the inside of the whale a stringer was fastened. The frames are – in contrast to *De Meern 1* – single with alternating floor timber knees against the port and starboard side. Another feature of the construction, yet a complete surprise and uncommon in Zwammerdam-type barges, was the presence of mortice-and-tenon joints to connect the planks mutually. So a genuine Mediterranean technique was used. Frames and strakes are connected by nails from the inside and outside. Again like *De Meern 1*, above each seam between planks a 'limber hole' is cut, probably for ventilating the seams (de Groot, Morel 2007, p. 49). The mortice-and-tenon fastenings are not placed in a regular pattern. The slots are remarkable in their size and form: very wide at the seam between the planking. The fit between slots in adjacent planks is not exact. Some tenons are even placed beside the mortices (**fig. 6**). This mortice-and-tenon technique is used in a rather rough and clumsy way. As to the sequence of construction, the presence of spike-plugs is of relevance (de Groot, Morel 2007, p. 39). They showed up in two athwartship rows, 1,25 m apart. They were placed centrally in the planks, with only one spike-plug for each plank. In one row the spike-plugs were found only in the two outer bottom planks while the other row has them only in the five central planks (**fig. 7**). Morel (de Groot, Morel 2007, p. 39-41, 54) states that the bottom planks were temporary connected to a beamframe, on which the bottom planks were nailed. After inserting and fastening the frames with short nails from the inside to the bottom planks, the ship was tilted and long nails were hammered in from the outside and turned over on the floors on the inside of the hull. After this the temporary beamframe could be removed, the ship was put back into a horizontal position and the nails connecting the bottom planks with the temporary beamframe were pulled out. The nailholes were closed with spike-plugs, only from the inside. The nail holes in the outside of the bottom planks probably closed automatically, after the ship was launched (J. Morel, written communication 2010).

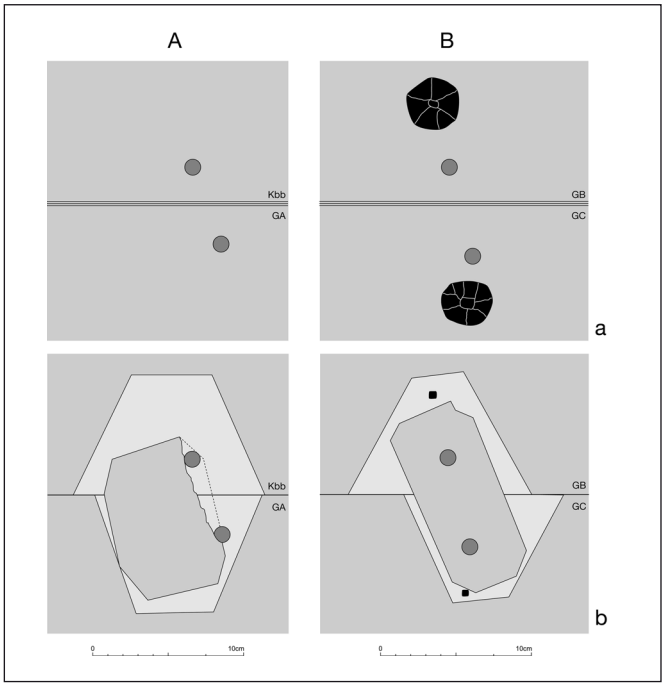

Fig. 6. Mortice-and-tenon connection between bottom planks of *De Meern 4* (drawing J.M.A.W. Morel, RCE).

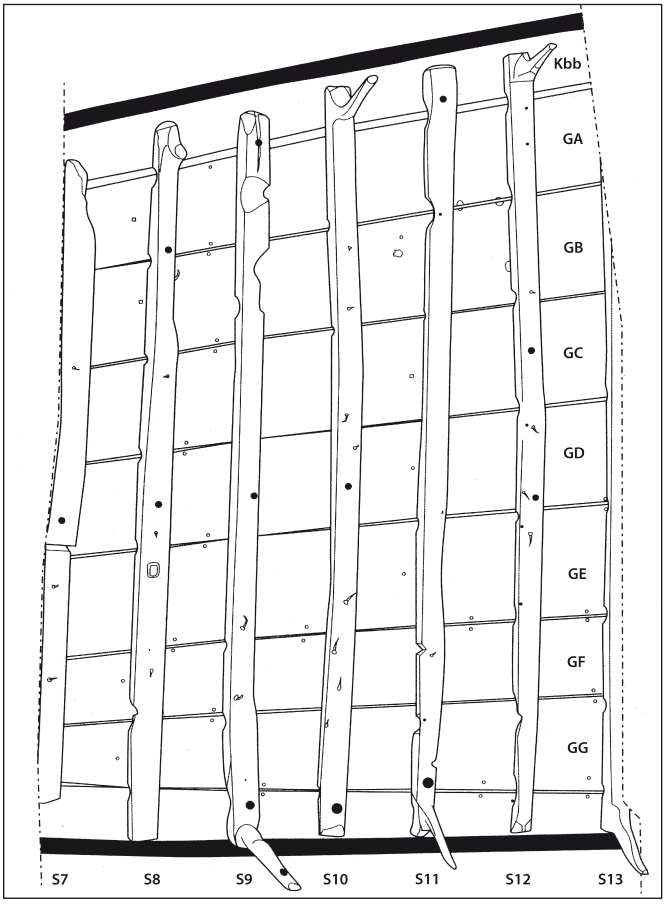

Fig. 7. Different rows of spike-plugs in the bottom planks of *De Meern 4* (drawing J.M.A.W. Morel, RCE).

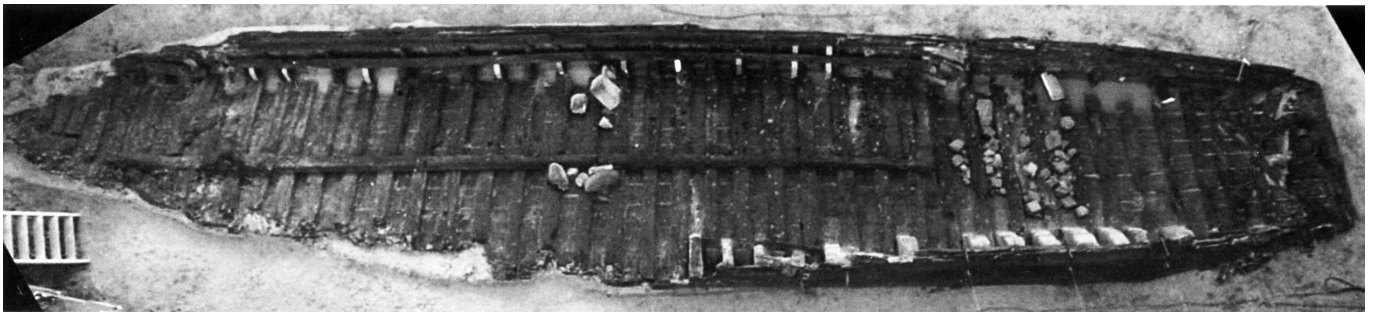

Fig. 8. *Woerden 7* during excavation (after Blom, Vos 2008).

Woerden 7

The year 2003 was an extremely rich 'Roman barge year' in the Netherlands. For in that same year not only *De Meern 1* and *4* were found and (partly) excavated, but also another Zwammerdam-type barge, *Woerden 7*, was unearthed. The barge was found to the northwest[1] of the *castellum Laurium* (**fig. 1**). In the vicinity of the vessel no traces of a sheetpiling or a wharf were present. Although the excavators state that the ship had been foundered, it seems more plausible the ship was put aside, because it was found on a southern riverbank along the river Rhine, on the transition of the bank to the river. Moreover there was no artefactual inventory or cargo of any significance left inside the wreck. After the barge was left aside the riverbed moved within a short period of time 50 m to the north, so the wreck got covered up quickly by sediments. What is quite clear is that the vessel has to be placed in the military context of the Roman frontier, the *limes*.

The *Woerden 7* is a barge of Zwammerdam-type, with a box-like shape and parallel sides. The close resemblance to *Zwammerdam 6* may indicate that the two were sister-ships (Blom, Vorst, Vos 2008, p. 391). To name but a few similarities: a long keelson with mast step, cross-bond frames (probably both fore-and-aft) and a single framing system. The reconstructed length is 29,6 m and the beam is 4,7 m (**fig. 8**). Again the transition of the bottom to the sides consists of an L-shaped chine. The chine consists of five pieces: a long part over most of the length of the vessel and two shorter pieces at the ends where the swimhead is situated. A triangular piece of wood connects the middle and end parts of the chine. The bottom is flat and made of ten flush-laid strakes. The seams between the strakes were caulked with reed mace (*Typha latifolia*), which was held in place by thousands of small nails and laths at the swimheads. The frames

Fig. 9. Rowing fittings of *Woerden 7* : gunwale with holes and oarlocks. (after Blom, Vos 2008).

are single with alternating floor timber knees at port and starboard. Again, as with the barges *De Meern 1* and *4*, limber holes were cut in the underside of the floors above all plank seams.

The vessel shows some very interesting details. The side plank is carvel-built and fastened to the L-shaped chine with iron cramps. Also interesting is the L-shaped covering board on top of the side plank. Finally the rowing fittings are an interesting element of the construction of the vessel (Blom, Vorst, Vos 2008, p. 366). In the gunwale holes are made to secure the oars (with a rope or leather strap) and on top of the gunwale oarlocks are visible (**fig. 9**). Furthermore, in the covering board dovetail joints are cut, probably for thwarts. The thwarts themselves have not been found. The rowing fittings might indicate that the vessel was not only used for transport downstream but also was capable of rowing upstream.

The trees used for building the vessel have been felled in the winter of 162/163 AD. The trees grew in Mid-Germany and again – surprisingly – in the Mid-Netherlands. The wood provenance makes a building place for the barge in the Mid-Netherlands very likely. Like the wood provenance of *De Meern 1* shows, the

1 In the excavation report, the wreck is erroneously situated to the southwest of the *castellum* (Blom, Vorst, Vos 2008, p. 352).

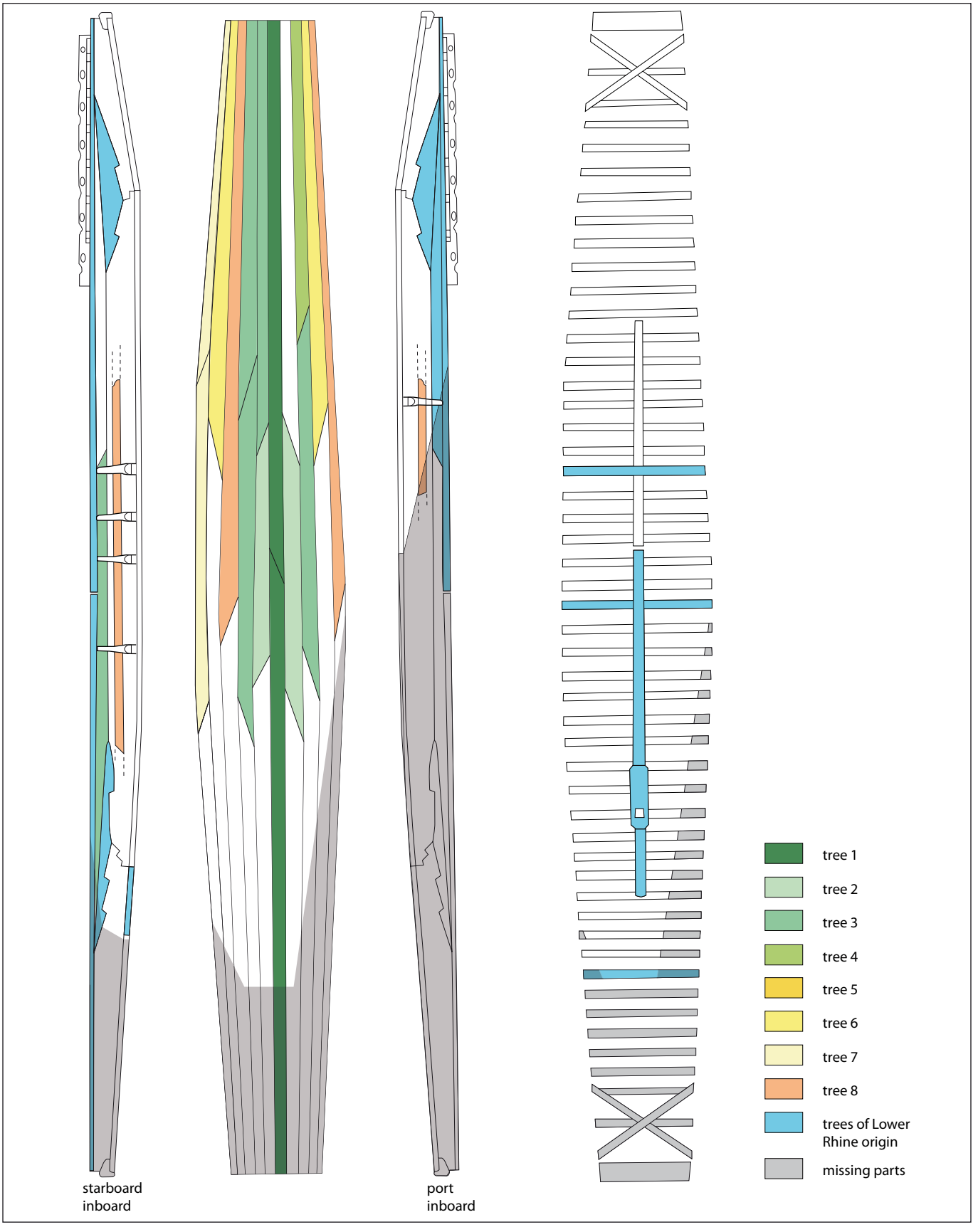

Fig. 10. Planks from the same tree are placed systematically around strake 5 (drawing Y. E. Vorst).

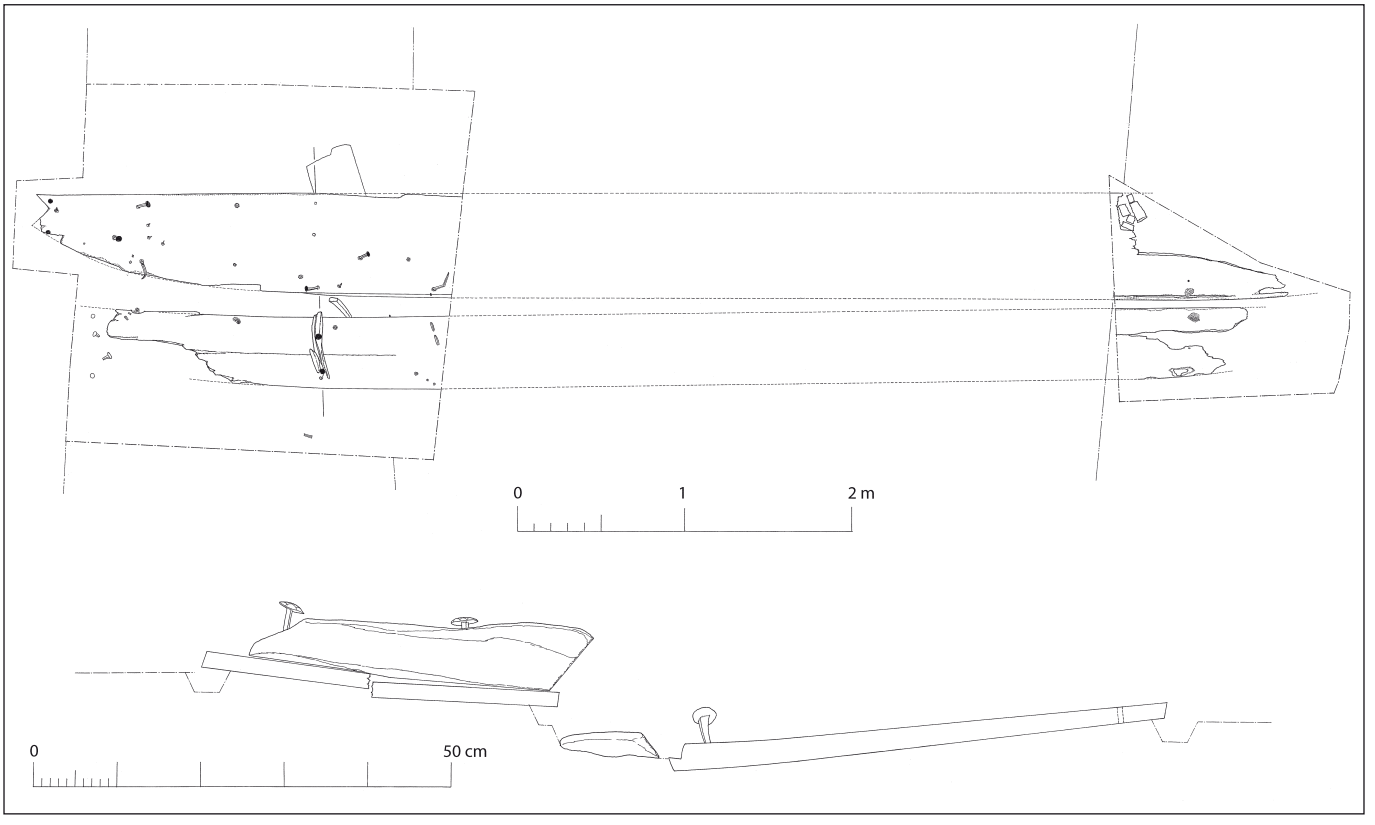

Fig. 11. Plank remains of *De Meern 6* in situ (drawing J.-M.A.W. Morel and F. Dallmeijer, RCE).

idea that Roman barges were built upstream in Germany has also to be revised in the light of the results of the dendrochronological research of the barge *Woerden 7*. One of the other interesting results of this research is the arrangement of the planking (Blom, Vorst, Vos 2008, p. 383). Planks from the same tree were placed sytematically around strake 5 of which the left side actually forms the centre line of the ship (**fig. 10**).

De Meern 6

In March 2008 fragments of wood were discovered near De Meern (**fig. 1**). Investigation by the Cultural Heritage Agency (former RACM, former NISA) showed the timbers to be from a highly interesting shipwreck: a punt-like craft from the Roman era. At this moment the date is uncertain, but on the basis of the stratigraphy a date in the third century AD seems likely. If the date is correct this is the first punt dating in Roman times in North-western Europe (Morel n.d., p. 3).

Only one – of the probably two - bottom planks was found, together with one strake of the sides (**fig. 11**). Of the inner timbers only a fragment of a frame survived that was nailed to the bottom planks. Nails and nail holes indicate the position of the other frames. The nails used to connect the frames to the planking are quite large: this is another indication for a Roman vessel.

One end of the bottom strake shows a rabbet for a stem or stern post.

A preliminary reconstruction of the vessel was made, which led to the following dimensions (Morel n.d., p. 9): length of the bottom 9 m, width of the bottom 1,05 m. The bottom consisted of two planks and had a lancet form at the ends; the sides were probably made out of one plank. The side plank fitted into a rabbet in the edge of the bottom plank. From the oblique underside of the end of the one preserved frame the rake of the sides could be deduced at about 125°. The mean framing distance is 59,75 cm, which is close to two Roman feet of 29,6 cm.

The reconstructed overall length of the vessel is between 9,5 to 10 m, the width 1,5 to 1,6 m and the depth 0,35 to 0,40 m.

Punt-like vessels are still being built in the Netherlands and they are often referred to as typically Dutch. This find shows that the punt-like vessel might be of 'Italic' design (Morel n.d., p. 13)!

Research project concerning ships of the Zwammerdam type

Between 1968 and 1971 the Roman auxiliary fort *Nigrum Pullum*[2] (**fig. 1**) situated on the southern riverbank of the Old Rhine near the modern town of Zwammerdam was excavated by the University of Amsterdam (former Institute for Pre- and Protohistory IPP) (Haalebos 1977). *Nigrum Pullum* was founded in the middle of the 1st century AD. The military settlement was burnt down during the Batavian revolt in 69 AD when most Roman forts along the lower Rhine were destroyed. A wooden fort was built shortly thereafter, which survived until *c*. 175 AD. A third occupation phase in which the main building (the *principia*) and the walls surrounding the fort were rebuilt in stone, lasted until *c*. 275 AD. During the occupation a wooden revetment of some 500 m in length was constructed along the riverbank just outside of the fort (De Weerd 1988, p. 26-27).

Along this revetment a seven meter oak dugout was found in 1971, followed by two other dugouts and three barges of 20, 23 and 34 m in length all in the same area. The barges showed strong similarities and are known as the Zwammerdam type barges. These ships are long and flat-bottomed with no keel. They have long, low vertical sides, with ribs mostly comprised of single pieces of L-shaped timber, with the long sides nailed to the bottom and the shorter vertical pieces supporting the sides. Most distinctive is the L-shaped plank, cut from a single piece of timber, which forms the right angled junction between the side and the bottom of the craft (Marsden 1976, p. 44-46).

All vessels from Zwammerdam were excavated and put in conservation which, with some interruptions, took 30 years to complete.

During that time, in the Netherlands new barges of the Zwammerdam type were discovered and excavated in 2003 (*De Meern 1* and *Woerden 7*)[3] and 2005 (*De Meern 4*)[4]. *De Meern 1* was lifted and put in conservation taking up much of the capacity to conserve large 'wet' wooden artefacts in the Netherlands. Therefore, the discovery of *Woerden 7* shortly after the excavation of *De Meern 1* made the excavators of this barge decide to record this vessel as best as possible by taking it apart while recording, retaining only some characteristic parts for conservation. This approach allowed for extensive dendrochronological sampling.

The dendrochronological research of *Woerden 7* was directed at answering questions about provenance (i.e. to locate the source area of the trees used for building the ship), but also yielded information on the construction date, the building sequence, and the choice of timber (Vorst 2005). The results still need to be integrated in a report on the construction of the barge *Woerden 7*. This will be part of a PhD project carried out by Yardeni Vorst, which is currently investigating the conserved ships *Zwammerdam 2* and *6* in a similar way[5]. *Zwammerdam 2* will be rerecorded and reassembled after dendrochronological study. *Zwammerdam 6* will be dendrochronologicaly examined, but not reassembled.

When investigating regional influences and Mediterranean characteristics of fluvial ships from the Roman period, it is important to look at the ships themselves, but also at the region where they were found and functioned. What did these vessels carry, i.e. what was their function and where did they navigate? Current research[6] informs us that the barges in the western part of the lower Rhine *limes* functioned in an environment that was highly structured towards shipping by the Roman army (Van Dinter 2008, p. 30). The Zwammerdam ships were found right outside a military fort, as were other ships of this type, for instance the barges of Woerden. Hence the military connection should be further explored.

The research is part of a larger project[7], which looks at the Roman wood and timber economy in the lower Rhine delta and will also focus on barges from the transalpine region in general.

Conclusions

The artefactual inventory of the barge *De Meern 1* sheds some light on the organisation of shipping along the *limes*. The skipper might have been a veteran of the Roman army, not necessarily Roman as the composition of the artefactual inventory shows, but rather of indigenous Batavian origin.

2 As indicated on the Peutinger map, a medieval copy of a Roman travel map.

3 As described above; published in Jansma, Morel 2007 ; Blom, Vos 2008.

4 As described above; published in De Groot, Morel 2007.

5 'Barges of the Zwammerdam type: chronology, provenance, construction and wood technology'.

6 NWO-research programme (Humanities) 'A sustainable frontier: The establishment of the Roman frontier in the Rhine Delta'.

7 NWO-research programme (Humanities) 'Arts and crafts in Roman ship building: raw material management, Construction, technology, use and disposal of barges in the lower Rhine region in the Roman period'.

Dendrochronological research of barges *De Meern 1* and *4* and *Woerden 7* indicates that at least some of these barges were built in the Netherlands. This means that the Roman tradition of ship-building was maybe more firmly established along the northern part of the *limes* than until now has been assumed. The barge *De Meern 4* makes clear that the Mediterranean technique of mortice-and-tenon to connect the strakes was in use along this part of the *limes* around 100 AD.

From the find *De Meern 6* it can be assumed that punt-like vessels are certainly not typically Dutch, but are of 'Italic' design.

It is clear that lots of questions are unsolved and more research has to be done on this interesting group of ships. That is exactly the reason why a PhD program has been started in the Netherlands in which the barges *Zwammerdam 2* and *6* and *Woerden 7* will be re-examined, with regard to questions concerning the chronology, provenance, construction and wood technology.

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